



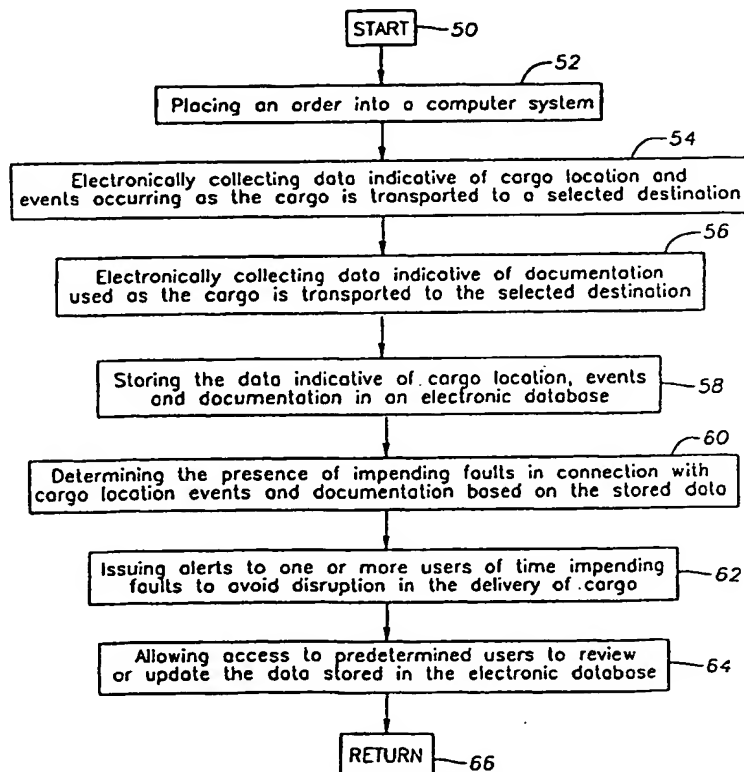
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(54) Title: SYSTEM AND METHOD FOR INTERACTIVELY MANAGING TRANSPORTATION OF CARGO AND DATA ASSOCIATED THEREWITH

(57) Abstract

A computer system and method for managing delivery of cargo and data associated with the cargo includes a server computer accessible over a global communication network and a program operable (50) in the server for optimizing an order or possible order for cargo transport in a manner which selects mode, frequency, parcel size, and storage so that costs are minimized. The system allows for placing an order (52) for transporting the cargo from a selected loading site to a selected destination (54) and for electronically collecting data indicative of cargo location and events occurring as the cargo is transported to the selected destination (56). Additionally, the system tracks data indicative of cargo documentation required as the cargo is transported to the selected destination and maintains a database (58) of cargo location, events and documentation data so as to determine impending faults in connection with cargo documentation, location, and/or events (60). Alarms of impending faults are issued to system users so that corrective action can be taken by at least one or more of the users so as to avoid disruptions in the delivery of the cargo (62).



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- 13) Vessel Name (Lloyd's codes)
- 14) Voyage Number
- 15) Captain's Name
- 16) Surveyor Name and Locations
- 5 17) Action Status
- 18) Charter Party Information (date signed with City and State Locations, Parties involved in the charter)

Step 54 allows for electronically collecting data indicative of cargo location and events occurring as the cargo is transported to the selected destination. For example, the transportation asset, such as a rail car or transoceanic tanker, employed for transporting the cargo could be conveniently equipped with any suitable navigation system, such as a Global Positioning System, Loran and the like, and a transceiver which may periodically transmit data indicative of the position of the cargo to a tracking station (not shown). In some instances, the position data may be conveniently reported by the operator of the asset to the tracking station without having to use any dedicated navigation equipment as may be the case when the driver of a tanker truck reports passing through a given city by radio or telephone. Through the use of well known data retrieval techniques, the cargo position data can be uploaded from the tracking station to the server computer so as to be stored into database 16.

20 The collected data may further be indicative of events which occur as the cargo is transported to any selected destination. Step 56 allows for electronically collecting data indicative of documentation used as the cargo is transported to the selected destination. The documentation

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may include bill of lading documents, surveyor reports, import/export documents and the like. As previously suggested, any users designated by the client may be notified to perform specific tasks in connection with the cargo being transported to the selected destination. Further, such users may be requested to provide a reply message indicating when the tasks

5 under their responsibility have being completed. For example, when a survey of the cargo has been completed prior to delivery to a consignee, a surveyor could transmit data from their user computer to the server computer, or, for example, the user who is responsible for generating documentation in connection with the cargo as the cargo is transferred to another user, may transmit an electronic message to the server computer indicating that a bill of

10 lading has been completed. Step 58 allows for storing the collected data into database 16 (FIG. 1). Step 60 allows for determining the presence of impending faults in connection with the various transportation operations, such as cargo location, events, or documentation, based on the data stored in the database. Step 62 allows for issuing alerts to one or more users of the impending faults in order to avoid disruptions in the delivery of cargo. For example, if a

15 shipment is scheduled to arrive by a certain date at a selected destination for delivery to a consignee, and if no data exists in the database which would indicate that the bill of lading has been prepared, then an alert message can be conveniently issued to the user responsible for generating that bill of lading so that corrective action is proactively taken to remedy such deficiency. In this manner, the cargo would not be unnecessarily delayed at that destination

20 due to the lack of a bill of lading. Once any documentation related to the cargo has been completed, such documentation can be electronically forwarded to the computer server for storage in database 16. Prior to return step 66, step 64 conveniently allows access to

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authorized users to review or update the data stored in the database. Using techniques well known to those skilled in the art to insure secure electronic commerce, the user may be required to enter an authorized password and/or account number prior to being allowed access to the database. In this manner, the client can conveniently query the database so as to

5 obtain any desired information in connection with the cargo. This is particularly advantageous in view of the fact that, notwithstanding of the multiple users which may be involved in the transportation chain, all relevant data associated with a particular shipment can be conveniently queried from a single database which is readily accessible to the authorized users, regardless of any specific computer equipment or operating system used by

10 the various users, i.e., the user only needs a computer terminal with dial-up capability for accessing a global computer network (world wide web). The user can navigate to the database using an address or URL and will be prompted for appropriate access codes at the database site. In this manner, the client and service providers can monitor essentially in real time the progress of the various transportation operations in connection with any given

15 shipment. For example, upon review of the data stored in the database, the client or user can readily determine whether the surveyor has accurately completed any required surveys. In addition, the client could proactively communicate to those involved in the transportation and distribution operations of any desired changes to the order. For example, upon review of the data, and presuming that the cargo has not yet arrived at the originally selected destination,

20 the user could update their order to reflect any changes which may be induced due to new business circumstances. For example, instead of delivering the whole cargo to a storage terminal in Singapore, it may now be desired to route a portion of that cargo to another

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and then computes from the table the minimum costs of various paths through the table. The process of computing these paths is preferably implemented in a computer but could be implemented using conventional linear programming techniques. Persons familiar with the generation of optimal solutions using table processes will recognize how the tables are built and resolved using the illustrated method in FIG. 22. FIG. 23 summarizes the process shown in FIG. 22 showing how information is processed between shipper/receiver and the transport entity such as Stolt-Nielsen.

By way of example, the formation of the optimization model involves creation of indices, constraints, variables, objective function coefficients and bounds. The indices may include time periods, ship from locations, ship to locations, demand points, products, transportation modes, all locations and storage tanks by ID number. Constraints may include minimum and maximum for bulk shipment modes, mass balance, usage of ship from and ship to locations, tanks and tank container storage/capacity, required inventory, excess and space volume, storage in use, and minimum and maximum lifting and discharge per unit time. Variables may include external supply of product to source per unit time, transport of product from source to receipt by mode, inventory, demand, bulk storage capacity, excess storage over minimum throughput, amount of space storage, and amount of tank container storage. The variables and constraints may include upper and lower bounds which are used in conjunction with objective function coefficients (variable costs and fixed costs of transportation, cost to load/unload product, cost of inventory, variable and fixed storage costs) to set up the linear programming model. These data are used as shown generally in FIG. 24. The process discussed above is summarized in the flow chart of FIG. 23 where the

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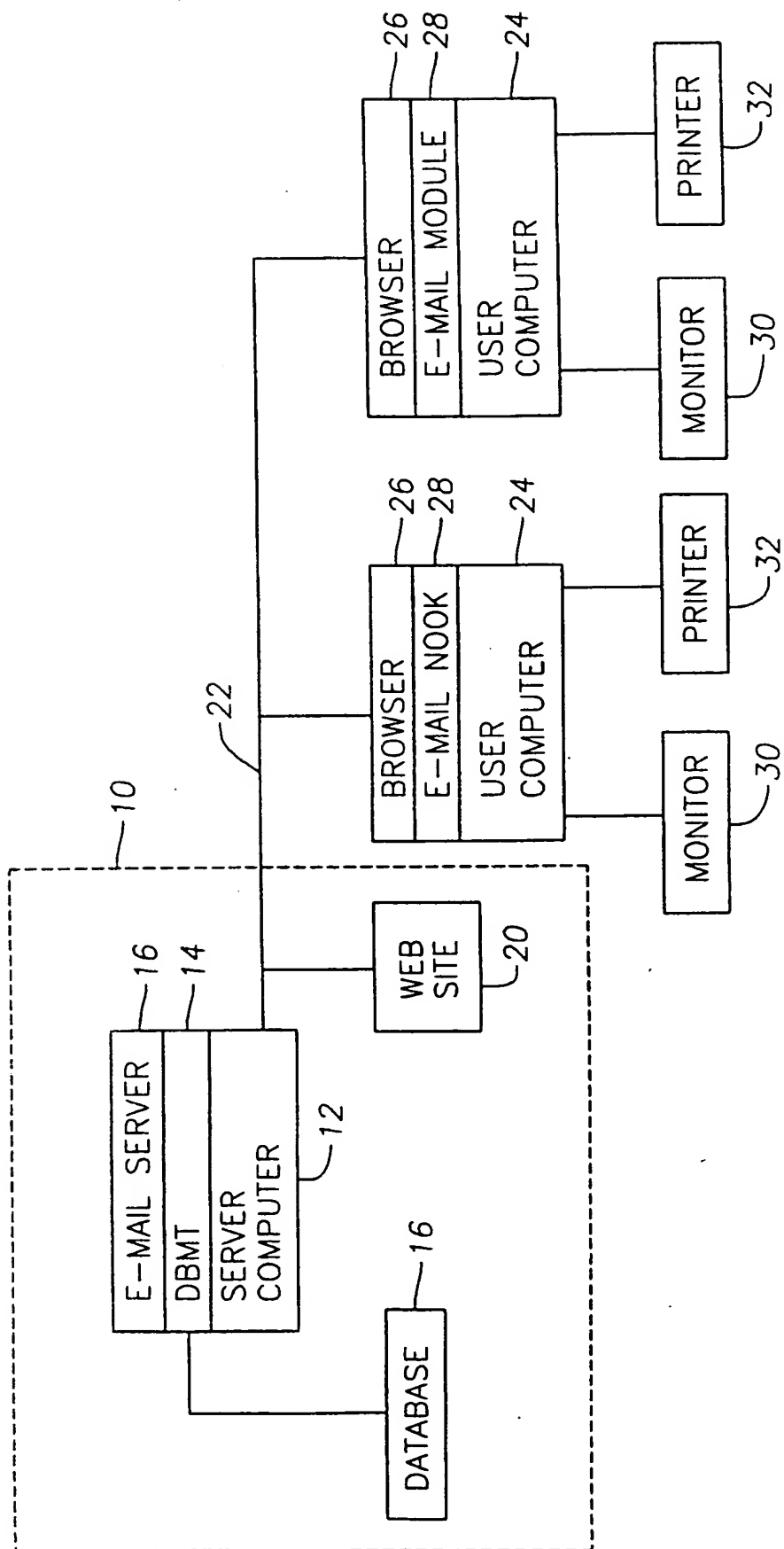
steps 100, 102 and 104 represent the data collection and cost collection steps of the process. Step 106 represents table creation from the data and costs. Once the table of step 106 is formatted, linear programming is applied to the table, step 108, to identify an optimal solution. Finally, the system creates or enters data into the database, step 110, to create the reports and orders (FIGS. 3-9) for effecting pick-up, transport and delivery of the products.

Referring now back to FIGS. 3-9, there are illustrated various forms of information which are available over the Internet connection using the access codes provided by the transportation organization. In essence, the global tracking program provides information which discloses each shipment and its status from the time that the shipper initially requests the shipment to the time at which the product is delivered at the using facility. Each of these FIGS. 3-9 are screen displays and will be readily recognized for the information contained therein. Various forms of screen displays could be used for this purpose depending on how the information is desired to be presented.

It will be understood that the specific embodiment of the invention shown and described herein is exemplary only. Numerous variations, changes, substitutions and equivalents will now occur to those skilled in the art without departing from the spirit and scope of the present invention. Accordingly, it is intended that an subject matter described herein and shown in the accompanying drawings be regarded as illustrative only and not in a limiting sense and that the scope of the invention be solely determined by the appended claims.

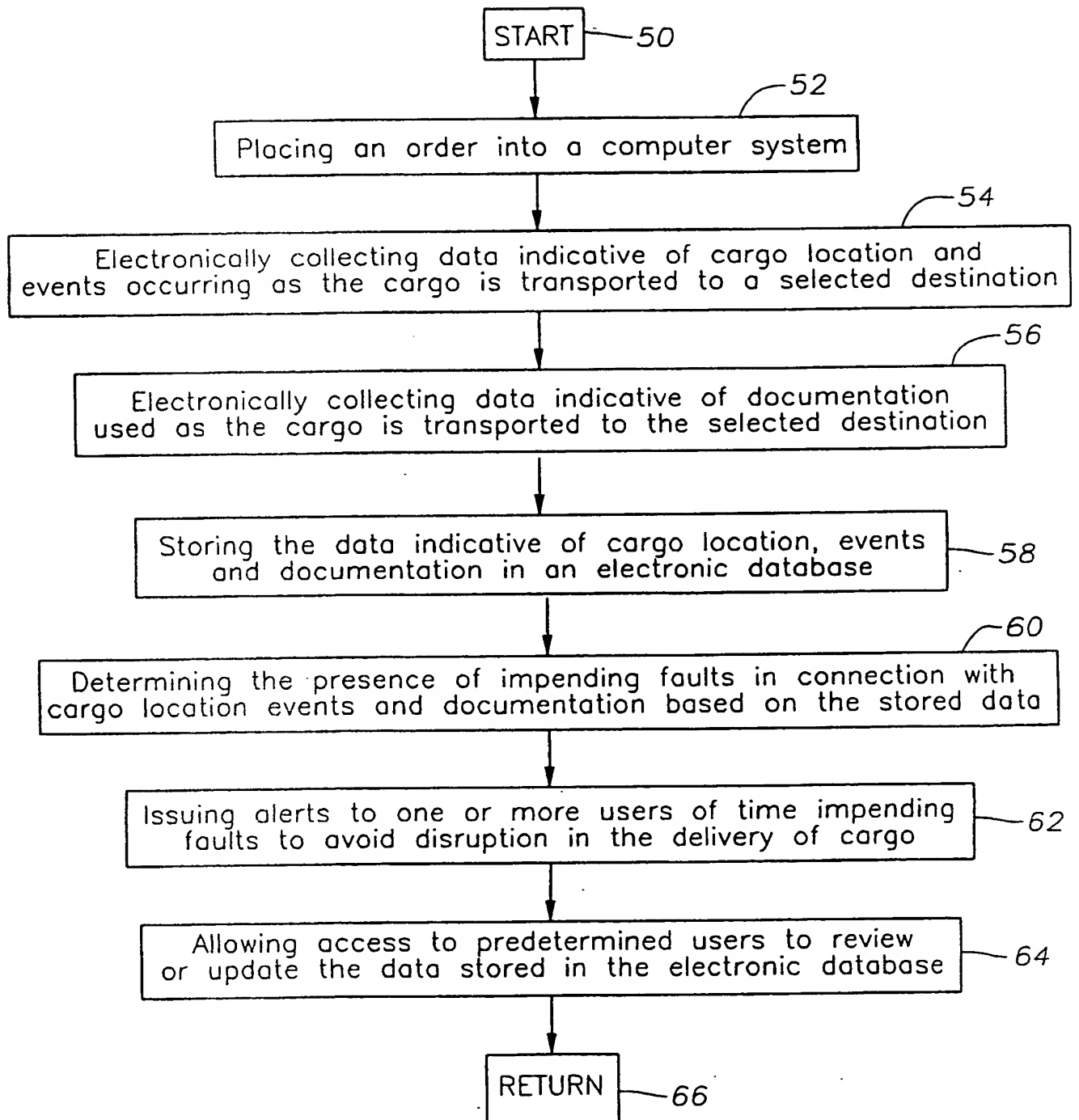
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Fig. 1



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Fig. 2



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Stolt Global Tracking - CONDEA VISTA

Help

Alerts Template Shipment Chronology Delegations

Alerts	Template	Shipment	Chronology	Delegations
KCS (Re...	1998-12-02		1999-01-20	In Transit
KCS (Re...	1998-12-09		1999-01-20(Est...	In Transit
KCS (Re...	1998-12-11		1999-02-00	In Transit
MT (Req...	1998-01-24		1998-03-03	Discharged
MT (Req...	1998-01-14		1998-03-04	Discharged
MT (Req...	1998-01-24		1998-02-04	Discharged
MT (Req...	1998-04-23		1998-06-17	Discharged
MT (Req...	1998-06-23		1998-07-18	Discharged
MT (Req...	1998-07-04		1998-08-20	Discharged

Refresh

Modify Shipment Create Shipment

Channelview, TX, US/HOUSTON...
Channelview, TX, US/HOUSTON...
Channelview, TX, US/HOUSTON...
Houston, TX, US/YOKOHAMA, J...
Lake Charles, LA, US/HOUSTON...
Lake Charles, LA, US/HOUSTON...
Lake Charles, LA, US/HOUSTON...
Brunsbutel, DE/ROTTERDAM...
Lake Charles, LA, US/HOUSTON...

Tank Container
Tank Container
Tank Container
Parcel Tanker - Ship
Coastal/Parcel Tanker - Ship
Coastal/Parcel Tanker - Ship
Coastal/Parcel Tanker - Ship
Coastal/Parcel Tanker - Ship
Coastal/Parcel Tanker - Ship

No Alerts(\$)
No Alerts(\$)
No Alerts(\$)
No Alerts(\$)
No Alerts(\$)
No Alerts(\$)
No Alerts(\$)
No Alerts(\$)
No Alerts(\$)

Channelview, TEXAS
Houston, TEXAS

Tank Containers

Location	Description	Est. Date	Act. Date
HOUSTON, TX...	Depart Depot Date		1998-12-11
HOUSTON, TX...	Estimated/Actual Date of Loading...	1999-12-11	1998-12-11
HOUSTON, TX...	Time of Departure WITH SCAU ON S...	1999-12-13	1998-12-13
HOUSTON, TX...	Estimated/Actual Time of Arriv WITH...	1999-12-17	1998-12-18
HOUSTON, TX...	Estimated/Actual Date of Delivery	1999-01-15	1999-01-18
HOUSTON, TX...	In depot mngt - interim		1999-01-19
HOUSTON, TX...	Return depot depot		1999-01-08
HOUSTON, TX...	Estimated/Actual Return Load Date		1999-01-19
HOUSTON, TX...	Estimated/Actual Return Delivery	1999-02-04	1999-02-03

Product View Document View Both

Help

Fig. 3

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Fig. 4

Stoll Global Tracking - CONDEA VISTA

Help

Alt

Template

Shipment

Chronologie

Delegations

KGS Re...	1998-12-02	1998-01-20	In Transit	CHANNELVIEW, TX, US/HOUSTON	Tank Container	No Alerts
KGS Re...	1998-12-09	1998-01-20	In Transit	CHANNELVIEW, TX, US/HOUSTON	Tank Container	No Alerts
KGS Re...	1998-12-11	1998-02-00	In Transit	CHANNELVIEW, TX, US/HOUSTON	Tank Container	No Alerts
MT Req...	1998-01-24	1998-03-03	Discharged	HOUSTON, TX, US/YOKOHAMA, JP	Parcel Tanker - Ship	No Alerts
MT Req...	1998-01-14	1998-03-04	Discharged	LAKE CHARLES, LA, US/HOUSTON...	Coastal/Parcel Tanker - Ship	No Alerts
MT Req...	1998-01-24	1998-02-04	Discharged	LAKE CHARLES, LA, US/HOUSTON...	Coastal/Parcel Tanker - Ship	No Alerts
MT Req...	1998-04-23	1998-06-17	Discharged	LAKE CHARLES, LA, US/HOUSTON...	Coastal/Parcel Tanker - Ship	No Alerts
MT Req...	1998-06-23	1998-07-18	Discharged	BRUNSBUTTEL, DE/ROTTERDAM...	Coastal/Parcel Tanker - Ship	No Alerts
MT Req...	1998-07-04	1998-08-20	Discharged	LAKE CHARLES, LA, US/HOUSTON	Coastal/Parcel Tanker - Ship	No Alerts

Refresh

Modify Shipment

Create Shipment

Surveyor

Due: 1998-08-21

Location	Type	Document Description	Due Date	Completion Date	Event
HOUSTON, TX...	KACHSIUNG, TW	SURVEY INBOUND	1998-08-21		Inbound Estimated/Actual survey date time

Product View

Document View

Both

Help

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Fig. 5

Slott Global Tracking - Acme Shipping						
Help Connection View Contract Period: [Arco Chemical/1-2-6 octylene ester] Expiration Date: 1998-12-14 Term: 7 months Inventory Summary [1-2-6 octylene ester] Total Net Volume = 12,345,679.80 Gallons						
Customer	Product	Tank	Last Measured Net Volume	Last Measured Date	Last Forecast Net Volume	Last Forecast ...
Arco Chemical	1-2-6 Octylene...	0	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	1	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	2	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	3	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	4	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	5	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	6	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	7	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	8	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	9	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	10	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	11	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	12	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	13	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	14	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	15	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	16	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	17	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	18	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	19	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	20	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	21	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	22	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	23	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	24	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	25	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14
Arco Chemical	1-2-6 Octylene...	26	12,345,679.80 Gallons	1998-12-14	12,345,679.80 Gallons	1998-12-14

Properties Update

Standard Temperature °F Standard Density Gallon/Lb
 Actual Temperature °F Actual Density Gallon/Lb

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Fig. 6

Shipment 0000000001 Ref. # A-0403873MT0409874

Shipper: ARCO CHEMICAL

Shipment #: 0000000001

Product: TETRAHYDROFURAN

Quantity: 16,900 KGS

Origin: HOUSTON, TX US

Destination: ANTWERPEN, BE

Shipper Reference #: A040983 MT0409874

Requested dates between: 1998-09-16 and (for load)

Confirmed dates between: 1998-09-17 and (for load)

Shipment Freight Forwarder Surveyor Receiver Special Instructions

Help Cancel OK

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Fig. 7

Create a New Shipment Without a Template

Receiver

Total Qty: 12,000 MT Total Receiver Qty.: 12,000 MT

Receiver	Quantity	Import Location	Customs House
Arco Chemical	12,000	SILKEBORG	

Customs

Quantity: 12,000.00 MT

Customs Cleared at: SILKEBORG,DK

Customs House Broker: NONE

Receiver Notify Party Also Notify

Arco Chemical Arco Chemical Service

☐ To Order Delivery Location: SILKEBORG,DK

Add Delete Modify

Help Cancel << Back Next >> Finish

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Fig. 8

CHEMICAL TETRAHYDROFURAN

Surveyor

Surveyor	Port	Survey	Bill of Lading
CALEB BRETT	HOUSTON, TX	Outbound	No

Port: HOUSTON, TX

Surveyor: CALEB BRETT

Inbound ☐ Survey ☐ For Bill of Lading Quantity

Outbound ☒ Survey ☐ For Bill of Lading Quantity

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Fig. 9

Create a New Shipment For ARCO CHEMICAL, TETRAHYDROFURAN

Receiver

Total Qty: 16,900 KGS Total Receiver Qty.: 16,900 KGS

Receiver	Quantity	Import Location	Customs House
Arco Chemical	16,900	ANTWERPEN...	

Customs

Quantity: 16,900,000 KGS

Customs Cleared at: ANTWERPEN, BE

Customs House Broker: NONE

Receiver	Notify Party	Also Notify
Arco Chemical	Arco Chemical Europe	

☒ To Order Delivery Location: ANTWERPEN, BE

Add Delete Modify

Help Cancel << Back Next >> Finish

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